



CLIMATE PROGRAM OFFICE

Climate Change Data and Detection

Can we detect the direction, magnitude, and rate of climate change?

Can observed climate variability or change be attributed to specific causes?

The Climate Change Data and Detection (C²D²) Program ensures that datasets that researchers need to understand the climate system are available for analysis. The program documents variations in climate on timescales ranging from less than a year to hundreds of years and longer. The program also supports data and information development for national and international climate assessment products.

C²D² Objectives

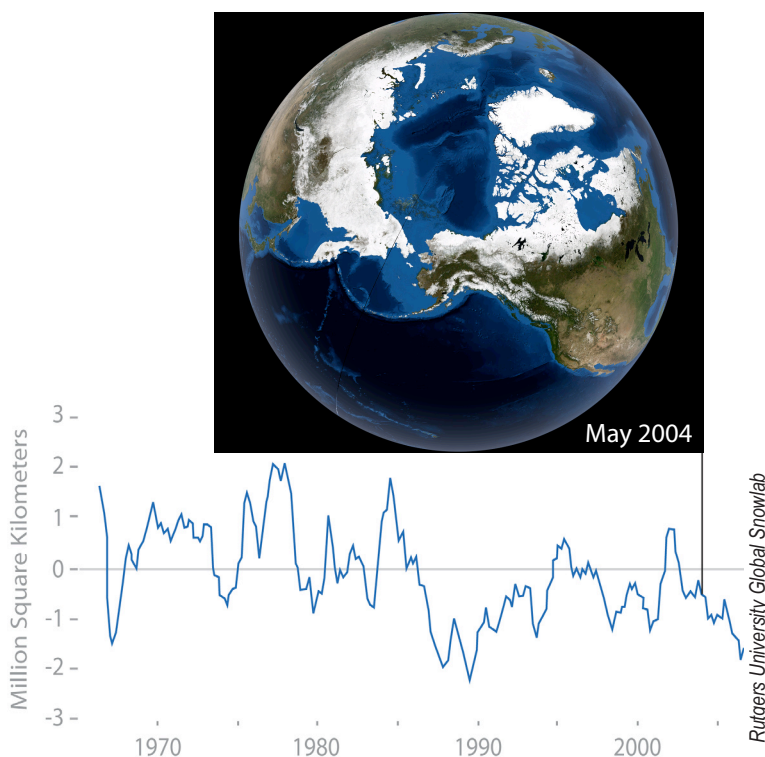
- Quantify and document observed climate variations and changes.
- Attribute changes in the observed climate record to specific factors that influence climate.
- Establish linkages between the paleoclimatological record and the modern instrumental record.
- Provide data and information development support for national and international climate programs and cross-cutting science.

Approaches

C²D² supports continuing, focused activities at universities and partners with research groups at NOAA laboratories to:

- Develop and analyze climate datasets, directly addressing uncertainties that result from factors such as physical and instrumental changes at observation stations.

Declining Snow Cover in the Northern Hemisphere



Records of key climate variables such as the area covered by snow each year is one outcome of work supported by C²D². The time series illustrated above shows the variability as well as the decreasing trend of snow cover in the Northern Hemisphere. Among other uses in research, this dataset can serve as input for global climate models, enabling researchers to explore how changes in snow cover relate to other climate events.

- Provide solutions to inadequate spatial or temporal resolution and coverage or biases within existing datasets.
- Utilize techniques of climate change detection and attribution to demonstrate that an observed change in climate is large relative to estimates of natural climate variability.

Climate Change Data and Detection Program http://climate.noaa.gov/cpo_pa/ccdd
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Approaches (continued)

- Establish cause-and-effect relationships between factors that influence climate and observed weather, especially extreme events.
- Use paleoclimatology methods to produce long time series datasets of key climate variables to characterize the natural background variability of the climate system.

C²D² Contributions

Projects supported by the Climate Change Data and Detection Program produce a range of datasets that are essential to national and international climate assessments. Specifically, these datasets support the Intergovernmental Panel on Climate Change (IPCC) assessments and the U.S. Climate Change Science Program's Synthesis and Assessment Products. Examples of datasets contributed to these efforts include atmospheric temperature, sea surface temperature, ocean heat content, tropical storms, precipitation, droughts, atmospheric water vapor, and clouds.

Additionally, C²D² advances climate science by supporting projects that:

- Identify and research possible changes in the characteristics of extreme weather events. Events considered in this research include tropical storms, heavy downpours, floods, droughts, heat waves, tornadoes, lightning, and wildfires.
- Improve regional climate forecasts through studies at continental and smaller scales.
- Encourage multiple-model approaches that can increase the validity of research results.
- Compile high-quality climate reconstructions for the last 2,000 years, blending paleoclimatological and instrumental data records.



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This slice of a Douglas-fir tree trunk was obtained in the Zuni Mountains of New Mexico. Scientists use variations in the ring widths of climate-sensitive trees such as this one to reconstruct the climate history of the region where they grew.